The strength of the argument to the effect that the descending track of the buzzard proves the existence of ascending currents of air lies in the assumption that the odor is carried upward by simple convection. Now Prof. John Zeleny, of the University of Minnesota at Minneapolis, has made a study of the rate of diffusion of odors in still air, and has communicated his results to the American Association for the Advancement of Science at its meeting in St. Louis in December, 1903. It is evident that if diffusion were more rapid than convection, then our argument would fall to the ground, but the contrary seems to be the case.

Professor Zeleny writes as follows:

In answer to your inquiry in regard to my experiments on the rate of propagation of smell, I beg to say that I find that smell diffuses very slowly. To prevent the disturbance due to convection currents, the experiments were carried on by having the odors diffuse through glass tubes of small diameter. As an example, it took over two hours before the smell of ammonia was detected at the end of a tube a meter and a half long. For shorter distances, the time required was roughly proportional to the square of the distance.

It seems, therefore, that the rapid way in which an odor spreads through a room is due almost entirely to convection currents.

Your elegant way of proving the existence of ascending currents in the atmosphere surely can not be affected by diffusion phenomena, since their effect is so slow.

I was especially interested in making my experiments to see if the particles producing smell might not be subatomic. The slowness of the diffusion is against this. But we do not know how much stuff is necessary before we can recognize the smell. Ammonia I could detect as soon chemically as with my nose. A peculiarity appears in camphor (large molecular weight) where in a vertical tube the smell ascended twice as fast as it descended. For ammonia, the rates up and down were about the same.

The only gas that I have used that may come from carrion is H_2S. The odor of this was detected at a meter's distance in about 35 minutes. In the formula $t = kl^2$, which applies roughly for short distances, $k = 0.21$ about, for H_2S and 0.27 for NH_3, t being measured in seconds, and l in centimeters; l is length of tube, and t is the time before the odor is detected at one end of the tube from the substance at the other end.

LOW BAROMETER DURING THE "PRESIDENT" STORM OF MARCH 12, 1841.

Prof. George Davidson, of the University of California, in a letter of December 27 to Prof. Alexander McAdie, says:

A case of excessive low barometer is given in Sir George Simpson's journey round the world in 1841-42. He was making the passage from Liverpool to Halifax in the *Caledonia*, Captain McKellar, a vessel of 1300 tons and 450-horse power. He says, on the morning of the ninth day out (March 12, 1841) Captain McKellar discovered that the barometer had fallen between two and three inches during the night, having descended to 26.9, the lowest point which, in his experience, it had ever reached. He then tells about the storm, and mentions that it was in this very storm that the steamer *President* was lost. "My recollection of a high barometer was in a terrific storm from the northwest, some time near the end of November, 1857. I was then off Barnegat (New Jersey), getting home. My memory puts the barometer at 31.4, but that was on shore."

THE MISCHIEF OF WRONG THEORIES.

During the past century there has been such steady progress in all branches of science that the more intelligent portion of the community has abandoned those notions with regard to astrology, alchemy, spontaneous generation, witchcraft, and other philosophies that were formerly accepted by the most learned. The diffusion of education has raised the children of the present generation above the level of the philosophers of a former generation. And yet we have seen it demonstrated again and again that the popular majority does not fully appreciate the extent of our present knowledge of the laws of the weather, and is still liable to resort to unscientific methods in hope of accomplishing that to which science has not yet attained.

We have seen communities in America and Australia carried away with the idea that cannonading can produce rain, or in Europe that the ringing of church bells or the offering of prayers can avert droughts and floods. In southern Europe the agriculturists are but just recovering from the strange belief that hail can be prevented by shooting rings of smoke toward the clouds. During the past ten years a wealthy engineer of Russia has devoted his fortune to the conversion of the people to his idea that the moon controls the weather, and so seriously does his advocacy of this error affect the uneducated agricultural community that the director of the weather service at Odessa (Klossovsky) has gone to the trouble of publishing an elaborate statement of the errors in fact and theory committed by this engineer. He shows very clearly that Demtchinsky's method of predicting the weather by lunar periods amounts to nothing more than predicting an average condition, an average which very rarely occurs, whereas the departures from it are very frequent. The verifications of these predictions are like the combinations in an ordinary game of chance, where there is an equal number of heads and tails, or hits and misses.

As the collection of meteorological statistics depends so largely upon the voluntary work of thousands of unpaid observers, it is to be feared that the good work we are doing in America may be seriously interrupted if erroneous views are allowed to have an influence in this country as profound as they seem to have in southern Russia.

We can not repeat too often and too clearly the general proposition that meteorology is to be advanced only by studying in details the effects on the atmosphere of insolation, radiation, the diurnal rotation and annual revolution of the earth, and the presence of continents and oceans.

AURORA AND MAGNETIC DISTURBANCES OF OCTOBER 30—NOVEMBER 1, 1903.

On October 30, 31, and November 1, some remarkable disturbances of the magnetic needle, a so-called magnetic storm, were reported from nearly all portions of the globe. Attending this great disturbance there also occurred auroras and earth currents on our globe, and sun spots and solar prominences. Of course this combination of phenomena is very common, as it has long been known that they are all associated together, but the magnetic disturbance of October 31 appears to be the most important that has yet been recorded. Although terrestrial magnetism proper is usually considered to be distinct from meteorology, yet the aurora is always included. We have, therefore, collected a few of the records of its recent appearance.

In the Annuaire of the Meteorological Society of France for November, 1903, the editor, M. Th. Moureaux, Director of the Observatory, Parc Saint-Maur (Seine), publishes a short note on this great magnetic perturbation, in which he says:

Magnetic pertubations have been rare and feeble during 1901, 1902, and 1903. But a more intense and long sustained series of pertubations began October 11, and after a calm interval of several days a new series of exceptional intensity began on October 31. This started suddenly at 6:12 a. m. with a simultaneous jump in the declination needle D and the horizontal component H, and a diminution of the vertical component Z. The great oscillations of D and H began at 7 a. m. and continued without interruption until 10 p. m. Then, between 10 and 11 p. m., H fell off greatly, but the phase of maximum density did not occur until about noon. At this moment Z, which had been but slightly disturbed thus far, rapidly increased, and the two other elements, D and H, experienced rapid and great variations. The observers remained constantly at the apparatus, and noted that D diminished by 1° 39′ in the interval between 1:52 p. m. and 1:55 p. m., but recovered by about 1° 18′ between 2 and 2:05 p. m. During the rapid movement of the declination needle eastward, the two components H and Z increased simultaneously in such a way that the total magnetic force also experienced a great increase at this time. Similar great oscillations were observed at 4 p. m., 5.30 p. m., and 7 p. m. In fact, the magnets were troubled throughout the whole night, and it was only at 2 a. m. of November 1 that Z returned to its normal value. In general the disturbances drove D and H below the average and those of Z above the normal. The extreme amplitudes of the variations were, respectively, 0.00680, or $\frac{1}{25}$ of its absolute value for the horizontal component; 0.00520, or $\frac{1}{81}$ of its absolute value for the vertical component; 2° 4′ for the declination. Disturbances of the same kind were recorded at all the other five French observatories and in general they were larger than ever before recorded. In England, at Kew, the disturbance of the declination was about 2° 12′ and at Stonyhurst 2° 46′ as compared with 2° 4′ at Val-Joyeux in France.

Sun spots had been observed in October, but there did not appear to be any direct connection between them and the magnetic disturbances; thus, on the 5th of November a new group of spots crossed the central meridian of the sun without any disturbance of the very regular magnetic curves of that day.

It seems, as has been shown by Tacchini, that the magnetic pertubations are less dependent upon the heliocentric longitude of the spots than on the rapid variations in their forms, variations to which they are not all subjected, but of which we can take account, either by direct observation or by a series of photographs. It is necessary moreover to observe not only the spots, but all manifestations of solar activity, that is to say protuberances and faculæ. In the course of the disturbance, the earth currents as observed on telegraph wires and cables attained an intensity much greater than the battery currents ordinarily used in telegraphy: consequently there were serious troubles in the transmission of messages and total interruptions sometimes occurred in both America and Europe. In France communication became impossible about 9 a. m., October 31, and could only be resumed at 4:40 p. m.

The aurora borealis was observed in the United States on the morning of the 31st, and in Ireland and Scotland on the evening of that day. No trace of the aurora was observed in France. A beautiful aurora was observed at Sydney, N. S. W. during the night of October 31–November 1.

The reports from vessels at sea are given elsewhere in a letter from Mr. James Page, of the United States Hydrographic Office, as also a report from the magnetic observatory at Zi-Ka-Wei.

From Table IV, page 496, of the October REVIEW, and page 558 of the November REVIEW, we copy the total number of United States stations reporting thunderstorms and auroras, as follows:

Date.	Thunder-storms.	Auroras.
October 27	5	1
October 28	11	1
October 29	13	2
October 30	71	19
October 31	89	139
November 1	83	18
November 2	38	6
November 3	47	2

STORMS ON THE SOUTHEAST COAST OF CAPE COLONY.

During the early morning of September 13, 1902, a violent storm suddenly struck the southeast coast of Cape Colony and caused great destruction of shipping and life along the shore of Algoa Bay, which is about 400 miles east of Cape Town. The beach facing Port Elizabeth was strewn with the wreckage of 29 sailing vessels and the bodies of over 100 sailors. The storm came absolutely without warning. There were 32 ships at anchor in the harbor under a leaden sky when the approach of a huge wave from the open sea gave the first warning of what was coming.

The study of the storms of south Africa by means of carefully compiled charts of the weather was, we believe, first prosecuted by Mr. Adolph G. Howard, of Cape Town, during 1885–1890. Others had compiled observations at individual localities, but to him is due the credit of preparing a systematic series of daily maps from January, 1885, to December, 1889, showing isobars and winds and the prevailing characteristics of the weather for the region between latitudes 25° and 33° south. These unpublished charts showed him the movements of storms, coming sometimes from the east and sometimes from the west, according to the season. The variations were very much the same as those experienced on our own coasts from South Carolina to Texas. The charts that are now being published daily for Argentina show similar variations in the paths of storms. Similar variations occur in the neighborhood of Australia, all of which merely goes to show that between latitude 20° and 40° in the Southern Hemisphere we have phenomena entirely analogous to those that occur between 20° and 50° in the Northern Hemisphere, so far as concerns the paths of revolving storm centers. On the other hand, we have in the Southern Hemisphere only the feeblest possible Antarctic cold waves, as compared with the very severe Arctic cold waves in the Northern Hemisphere. These latter flow from the Arctic Circle southward to latitude 25° in America, but scarcely as far as latitude 30° in Europe and Asia, while in the Southern Hemisphere they are only feebly represented by the southerly bursters of Australia and the southwest winds of Patagonia and Argentina. The southern point of Africa, Cape Agulhas, is too far from the Antarctic Continent and too well protected by ocean water to be ever reached by a wave colder than those that reach the equally well protected islands of the North Atlantic, such as the Bermudas and the Azores, which are in almost the same latitude north. Storm centers may approach the southern end of Africa from the southeast when the tropical area of high pressure to the eastward is unusually well developed or when the southeast monsoon is unusually strong. Storms may approach from the northwest when the tropical high pressure over the South Atlantic is unusually strong. Storms come down from the north when the interior of Africa is unusually dry and cool, so that it is brought under the influence of the South Atlantic area of high pressure.

DENSITY OF THE ATMOSPHERE UNDER DIFFERENT CONDITIONS.

A correspondent asks the Weather Bureau to make some experimental determination of the density of the air within areas of low pressure, as compared with the density within areas of high pressure. He also asks whether moist air has not a greater specific gravity than dry air, and if moist air under low pressure is heavier than dry air under high pressure.

It is a common idiom to speak of "a heavy atmosphere" when smoke settles down to the ground, or when heavy clouds form low down and threaten to rain; so also we speak of "dull and heavy weather" when we are conscious of a feeling of oppression. This is a poetic usage of the word heavy, in which we attribute to the atmosphere something that really belongs to ourselves. When the smoke falls or the clouds drop rain, it is not the air that is heavy, but the thing that falls. If we experience an oppressive feeling, it is our nervous system that is slightly deranged; the oppression is not a matter of weight or of meteorology, but is a complex physiological phenomenon.

The density of the atmosphere, or its specific gravity, or the weight of a cubic foot of air, increases in proportion as the barometric pressure is greater, and in proportion as the air is drier or free from moisture, assuming that the air remains at the same temperature. Consequently there can be no doubt but that the atmosphere in a region of low pressure and damp air has a smaller specific gravity than in a region of high pressure and dry air. It is not necessary for the Weather Bureau to make any special test of this subject, as its truth is manifest from the experiments made frequently in physical laboratories, in order to determine the properties of gases.

WEATHER NOTES AT WEST CUMMINGTON, MASS.

Mr. William G. Atkins, of West Cummington, Mass., writes, as follows:

Referring to my diary and weather records, which cover a period of forty-five years, I find that the snowfall which gave the most equivalent water occurred on April 20 and 21, 1857, when over 3 feet of heavy wet snow fell on the ground that was previously bare.

1861. February 7 was rainy and snowy; a violent snow squall came about 4 p. m. with a sudden fall in temperature. At 9 p. m. the mercury was at 0° F. and the next morning at 32° below, being a total fall of about 80°. It was 17° below at noon on the 8th of February. On one morning